



HAWKE'S BAY REGIONAL COUNCIL

REGIONAL COASTAL HAZARD  
ASSESSMENT: VOLUME I  
ASSESSMENT

REFERENCE NUMBER: 20514

FEBRUARY 2004

REPORT PREPARED FOR:  
HAWKE'S BAY REGIONAL COUNCIL

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## CONTENTS

	Page No.
1.0 Introduction	1
1.1 Scope of Works	1
1.2 Tasks	2
2.0 Existing Information Sources	5
2.1 Regulatory	5
2.2 Topography	5
2.3 Bathymetry	5
2.4 Geology	6
2.5 Seismic	7
2.6 Beach Material	8
2.7 Historic Shoreline Changes	8
2.7.1 Inferred from Geologic Record	8
2.7.2 Photographs	9
2.7.3 Beach Profile Information	11
2.8 Water level	15
2.9 Waves	16
2.10 Currents	20
2.11 Tsunami	21
3.0 Coastal Hazard Potential	22
4.0 Coastal Hazard Delineation	24
4.1 Shoreline Behaviour Units (SBU)	24
4.2 Land Use	24
5.0 Hazard Methodology	26
5.1 Soft Shore Erosion Zone	26
5.2 Cliff Shore Erosion Zone	28
5.3 River Mouths, Spits and Bars	31
5.4 Origin of Erosion Hazard Zone	31
5.5 Inundation	32

6.0	Technical Assessment	36
6.1	Long Term Erosion Rates	36
6.2	Short Term Fluctuations	40
6.2.1	Data Used in the Analysis	40
6.2.2	Method Used to Measure Shoreline Movement	41
6.3	Storm Cut	45
6.4	Foreshore Slope	45
6.5	Sea Level Rise	46
7.0	Coastal Hazard Assessment Results	52
7.1	Soft Shore Erosion	52
7.2	Cliff Coast Erosion	52
7.3	Inundation	52
7.4	Application	53
8.0	Coastal Hazard Management	62
8.1	Identification of Issues	62
8.2	Planning Approach	64
8.2.1	Resource Management Act	64
8.2.2	New Zealand Coastal Policy Statement	65
8.2.3	Regional and District Plans	66
8.3	Vision	68
8.4	Policy on Coastal Erosion Planning and Response	68
8.4.1	Key Principles	68
8.4.2	Planning and Regulation	70
8.4.3	Coastal Protection Options	72
8.4.4	Local Authority Participation in Erosion Protection Options	73
9.0	Potential Management Responses	75
9.1	Do Nothing	76
9.2	Status Quo	76
9.3	Planned Retreat	77
9.4	Adaptation (Accommodation)	78
9.5	Protection	80
9.6	Works by Private Individuals	81
9.7	Additional Investigations to Refine Hazard Assessments	83
9.8	Monitoring and Evaluation	83

10.0	Peer Review Comments	85
10.1	Methodology	85
10.2	Review of First Draft	85
10.3	Review of 2 <sup>nd</sup> Draft	86
11.0	Applicability	87
12.0	References	88

## Figures

1.	Location Plan
2.1	Waimarama Beach Profile Location
2.2	Southern Hawke Bay Beach Profile Location
2.3	Northern Hawke Bay Beach Profile Location
4.1	Shoreline Behaviour Units, sheet 1 of 4
4.2	Shoreline Behaviour Units, sheet 2 of 4
4.3	Shoreline Behaviour Units, sheet 3 of 4
4.4	Shoreline Behaviour Units, sheet 4 of 4
5.1	Coastal Erosion Hazard Definition Sketch
5.2	Inundation Hazard Definition Sketch
7.1	Example of Hazard Zone Mapping

## Appendices

**A. CD of Historic aerial photographs at selected cliff shore sites**

**B Peer review comments**

**Volume II: Summaries for Local Communities** (bound separately)

## **EXECUTIVE SUMMARY**

This report presents the findings of a coastal hazard assessment of the entire Hawke's Bay shoreline with a specific focus on areas with existing communities. The hazard assessment was done using existing published data and information as well as observations made during site visits by our coastal engineers. The study is reported in three volumes. The first volume (this report) contains the background, technical data, general results and management objectives and responses. Volume 2 contains the specific summaries for local settlements.

### **Objective**

The objective of the study was to develop a consistent methodology for erosion and inundation hazard mapping of sandy shores, gravel shores and cliff shores, while taking into account the relevant physical processes, geology, morphology, historic trends, subsidence, sediment supply and climate change effects.

### **Hazard Zone Methodology**

The hazard zone methodology has been developed taking into account that in some areas there is sufficient background information to permit a quantifiable hazard zone, while in other areas expert opinion and judgement is required to provide the basis for establishing the hazard zones. The zone widths are based on the cumulative addition expected erosion rates, episodic storm-induced erosion and climate change effects.

To provide a sufficient time scale for planning and accommodating development, a 100-year planning horizon has been considered. For long-term consistency the year 2100 was used as the actual terminal date of the analysis. Appropriate factors of safety are incorporated into each individual component of the equation.

Definition sketches of the hazard items considered for erosion and inundation are shown in Figures 5.1 and 5.2. Figure 7.1 shows the summary diagram defining the hazard lines.

Three erosion zones are delineated for soft shore areas:

- CERZ: The Current Erosion Risk Zone areas subject to storm erosion, short-term fluctuations and dune instability
- 2060ERZ: The Erosion Risk Zone to 2060 including erosion due to climate change to 2060
- 2100ERZ: The Erosion Risk Zone to 2100 including erosion due to climate change to 2100

For cliff areas the hazard zone is based on the long-term retreat rate (if present) plus two times the height of the cliff.

Two inundation levels were delineated:

- EIRZ: Extreme Inundation Risk Zone areas are those areas within the CERZ with ground levels below the calculated 2%AEP level including run-up and sea level rise to 2100.
- MIRZ: Moderate Inundation Risk Zone areas are those areas landward of the CERZ with ground levels below the 2%AEP level, inclusive of sea level rise to 2100 but excluding run-up.

## Results

The resulting hazard zone widths for soft shore erosion areas are shown in Table 7.1. The set back for cliff coast erosion is set out in Table 7.2. The resulting inundation levels for the soft shore erosion areas are shown in Table 7.3.

The results show that the entire region's shoreline is prone to storm damage and the influence of cyclical erosion and accretion trends, while there is the risk of erosion due to ongoing and accelerated sea level rise.

Moderate to high rates of long-term erosion are also evident for significant stretches of the shoreline due largely to a sediment supply deficit, ongoing adjustment to the 1931 earthquake and localised adjustments to landslides and slumps.

### **Coastal Hazard Management**

The existing planning provisions in the various regional and district planning documents do not provide a comprehensive means of considering the potential issues associated with coastal hazards.

A suggested policy on coastal erosion, consistent with the RMA and NZCPS obligations is included in Section 8.4., including key principles, planning and regulation, coastal protection options, participation in erosion protection options and partnerships.

### **Potential Management Responses**

Potential management responses under three main response options are identified in Section 9:

#### **Planned retreat**

Within the CERZ and cliff hazard zones we recommend the following planned retreat methods:

- No new council infrastructure be located within the CERZ unless required specifically within that zone (i.e. outfalls, changing rooms, toilet facilities, boat ramps etc).
- No new private development (i.e. no new residential lots, and no new dwellings).

Within the future hazard zones (2060ERZ, 2100ERZ) we recommend:

- No major council infrastructure be located within the zones unless required specifically within that zone.
- In existing residential zoned areas all new private development be designed to be readily and demonstrably re-locatable and habitable levels to be established above the design inundation levels. In our opinion, readily re-locatable implies lightweight construction techniques and does not allow concrete slab floor construction or the use of continuous concrete footings or edge beams.
- No further modification of land designation permitted in currently non-residential zoned land.

A range of rules is also required to take into account existing use rights for existing lawful structures and for development in the lower risk areas.

Site specific assessments by an appropriately qualified engineering geologist should be undertaken for cliff top development within the cliff hazard zones.

#### **Adaptation (or accommodation)**

Within the CERZ, 2060ERZ and 2100ERZ we recommend the following specific adaptation methods:

- Guidelines for appropriate private re-development of existing dwellings considering existing use rights, natural character, landscape and the coastal hazards.
- Notice of hazard (erosion/inundation/climate change) on land title, LIM/PIM.
- Raising awareness of hazards.
- Monitoring of erosion and inundation drivers.

### **Protection (or defence)**

Within the CERZ we recommend the following protection methods:

- Beach nourishment
- Flood control bunds set back on the upper beach system
- Dune restoration (re-vegetation) with the assistance of community based coast care groups
- Control of access

Other protection options, including groynes, seawalls, revetments maintaining road reserves and stream training works should be considered on a case-by-case basis and only if recommended protection methods are unsuccessful.

### **Additional Investigations**

It is possible that alternative hazard zone widths or inundation levels could be determined based on site specific investigations by appropriately qualified personnel. However, any reduction of zone width or level must be justified on the basis of additional information or investigation work.

### **Monitoring and Evaluation**

On going monitoring and data acquisition should be carried out in accordance with HBRC's long term monitoring strategy to enable a review and refinement of the coastal hazard assessment included in this report.

Council should promote or sponsor research on quantifying wave set-up and run-up for surging breakers on mixed sand gravel beaches.

Both the ongoing climate change impacts and the performance of implemented measures should be periodically evaluated in accordance with Council's long-term coastal monitoring plan.

## **1.0 Introduction**

Hawke's Bay Regional Council (HBRC) commissioned Tonkin & Taylor Ltd (T&T) to complete a coastal hazard assessment for the entire Hawke's Bay region using existing published data and information.

Although providing information on a region wide basis, the study had a specific focus on areas with existing communities. These areas, shown on Figure 1, include Mahanga, Maungawhio Lagoon, Whangawehi, Mahia Beach, Waikokopu / Opoutama, Nuhaka, Tahaenui, Wairoa, Waihua, Mohaka, Waikari, Aropaoanui, Waipatiki, Tangoio, Pakuratahi / Whirinaki, Esk River, Bay view to Westshore, Napier through to Clifton, Cape Kidnappers, Ocean Beach, Waimarama, Kairakau Beach, Mangakuri, Pouterere, Aramoana, Blackhead and Porangahau.

### **1.1 Scope of Works**

The scope of work includes:

1. Coastal Hazard Zone Methodology. This includes an assessment of both the erosion and inundation hazards for the current situation and taking into account future climate change to 2100 using the latest IPCC predictions. The purpose of this assessment was to develop a consistent methodology for erosion and inundation hazard mapping of sandy shores, gravel shores and cliff shores while taking into account the relevant physical processes, geology, morphology, historic trends, subsidence, sediment supply and climate change effects using existing published information and recognising the various spatial requirements.
2. Develop hazard zone maps for the region based on the methodology developed in 1 above.
3. Identify management strategies to control and manage the potential adverse effects arising from the hazard identification.
4. We understand that HBRC staff will be involved with the project team specifically in terms of extracting and supplying the required data from

Council's data bases and to assist in developing the hazard maps in Council's GIS system.

## **1.2 Tasks**

The following tasks will be carried out to achieve the required objectives:

1. Identify existing information, specifically with regard to availability of image, cadastral boundary and contour information from Council's GIS data.
2. Review all relevant background information, data and studies relating to coastal processes and hazards for the Hawke's Bay region.
3. Identify shoreline types and develop an erosion/inundation methodology for each shoreline type. This will be done by review of available aerial photographs, geologic maps and topographic maps.
4. Undertake site inspections for ground verification and confirmation of shoreline types. Two Tonkin & Taylor Ltd staff carried out this inspection.
5. Delineate shoreline types. There will be larger spatial resolution for non-developed areas and closer spatial extents in developed areas. For the majority of the gravel beach area we will be using the region's beach profile locations as the minimum spatial extent.
6. Issue methodology to Dr. Willem de Lange for peer review. The preferred outcome before progressing will be consensus on methodology between the peer reviewer and Tonkin & Taylor.
7. Present methodology to Council for comment.

8. Data collection including preparation of briefs for council staff regarding data requirements. This will involve council officers compiling data that will include profile data, topographic information, cadastral and aerial photographs.
9. Complete a hazard assessment for each identified area or profile and identify exclusion areas around stream and river mouths. Erosion hazard lines will be produced for the current risk and including sea level rise and climate variability allowance to 2060 and 2100. Inundation levels will also be assessed for the current hazard and including sea level rise effects to 2060 and 2100.
10. Hazard Report (First Draft - Peer review copy). This will involve issue of the report to the peer reviewer with comments sent to T&T. No meeting is anticipated for this task. The report will also identify information gaps required to be filled and update the long term monitoring plan currently being implemented by HBRC.
11. Hazard report (Second Draft – Council copy).
12. Develop hazard zones on Council’s GIS. It is envisaged that a Tonkin & Taylor Ltd staff member will assist Council officers extrapolate the hazard zones between identified profiles.
13. Prepare Coastal Hazard Management Strategies Report. Identify key management issues and strategies for mitigation and management of the identified coastal hazard. It is anticipated that there will be generic options for various land uses and developments to facilitate implementation into regional and district plans. However, local strategies and rules may also be required in some cases. This report will identify the options for mitigating the effects of the coastal hazards, the pros and cons of each option and identification of the preferred options for further consideration. The report will also consider how best to dispose of engineering structures that are no longer effective and the

place and contribution of coast care schemes and Council's wetland programmes that occur along the coast.

14. Coastal Hazard Management Strategies Report (Draft for Council Review).

15. Finalise and issue both reports.

16. Presentation to Council. This will be done by the project manager

17. Public presentation. This will be done by the T&T project manager. It is assumed that the Council presentation and the public presentation will be carried out during the same visit.